

**Questions for the Record**  
**U.S. House Ways and Means Committee**  
**Hearing on The Economic and Health Consequences of Climate Change**  
**May 15, 2019**

From Congresswoman Gwen Moore to Katherine Marvel, Ph.D.

- **To what extent can we reasonably expect the renewable energy technologies we are pursuing today to effectively replace fossil fuels and by when? Please identify which technologies you view as viable options.**

About 11% of current US energy comes from renewable sources; the energy flow charts at <https://flowcharts.llnl.gov/commodities/energy> are a useful way to visualize energy production and use). There is no *physical* barrier to rapidly scaling up many of these technologies, and a National Renewable Energy Laboratory study (<https://www.nrel.gov/docs/fy13osti/52409-ES.pdf>) found that renewable technologies can supply at least 80% of the nation's energy by the middle of the century. Wind energy is the most rapidly growing renewable source, and onshore wind resources can generate over 120 times more than the current installed capacity. Existing solar photovoltaic technology can also be deployed at a much greater scale; the US Department of Energy has found that solar photovoltaic panels could theoretically meet the entire electricity demand if installed on 0.6% of land. These technologies are already viable, but a large-scale transition to lower-carbon energy will likely require improvements in efficiency, electrification of transportation, grid modernization, and improved storage.

- **What is the biggest technological hurdle, if any, that scientists and innovators currently need to surmount that would unleash the power of renewable energy?**

The greatest hurdles to renewable energy adoption are economic and regulatory, not technological. However, there is a lack of infrastructure necessary to support existing renewable energy technologies. Current grid technologies exist to handle predominantly coal, nuclear power, and natural gas, which are highly centralized sources of power. New transmission infrastructure is likely necessary to handle wind and solar, which are more decentralized.

- **Please describe the systemic and structural deficiencies of the US approach to addressing climate change that have exacerbated inequality in the US.**

There is already evidence that climate change has likely exacerbated global economic inequality (<https://www.pnas.org/content/116/20/9808>). Within the United States, populations that have less access to financial resources (loans, savings, insurance) are harder-hit by weather disasters and find it more challenging to recover than more advantaged populations. Limited adaptation funds may also be allocated in ways that reinforce or worsen existing inequalities.

**Minorities, tribal communities, and low-income individuals face the greatest threats from climate change. How can Congress act to protect populations who will bear the brunt of climate change without imposing high costs on already vulnerable populations?**

Climate adaptation and managed retreat can pose high costs for marginalized communities. While *adaptation* is already necessary and will be more so in the future, efforts to *mitigate* climate change through reducing greenhouse gas emissions are also crucial. In order to limit warming to 1.5 degrees Celsius above pre-industrial temperatures, carbon dioxide emissions will need to fall dramatically. Studies estimate that anywhere between 7 and 31 years of current emissions will lead to the world exceeding the 1.5C threshold (see <https://www.carbonbrief.org/analysis-how-much-carbon-budget-is-left-to-limit-global-warming-to-1-5c>).